GOSAMVARDHANA

Vol. IX No. 10

JANUARY, 1962

PAUSH-MAGH 1883 Saka

—To strengthen the Cow in her entirety is a vital task. In this, the participation of all the people is much more important than for any other work. And the help of the experts and specialists is specifically required. Discussions, resolutions, publications and articles and all such things do accelerate the momentum of the work to some extent, but I cannot feel satisfied only with these. This is not the fundamental thing. The main thing is practical and direct work......for the furtherance of **Goseva,** *the service of the Cow. Such direct and practical work is of prime importance......The basic thing is that whatever work we have undertaken in the sphere of* **Goseva** *has to be completed with all the energies and all the means with us.*

2-2-'42 —*VINOBA BHAVE*

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Editorial

YOU AS REGULAR PARTNERS OF GOSAMVARDHANA JOURNALS

As Shri U. N. Dhebar, the ex-President of the Central Council of Gosamvardhana, pointed out in his special message to the Gosamvardhana Journals in inaugural bifurcated issues (July '61 issues), we aim not only at disseminating knowledge through the medium of Gosamvardhana Journals on scientific lines about the various aspects of cattle development with special reference to the cow in this country, but also at creating an interest in the people in general and an awareness in the country about the importance of the cow as an integral part of our national economy; apart from its place in Indian culture and civilisation. The increasing interest in the readership in our journals is indicative of the response given to our new features and the progressively changing but pleasing get-up of these publications. However, the process has to be vigourously followed and the pace accelerated.

To our contributors, we have to make an earnest appeal to write for our journals not merely in larger quantity but to provide us with qualitatively more solid and authentic material. The write-ups prepared with a practical bias and presented in a simple language and lucid style are relatively more welcome to our readers. The criterion with us for the suitability of a contribution in the journals has to be determined on the extent to which our readers can understand and grasp the material produced. There are various facets of the cow which are yet to be brought to the fore from our ancient scriptures, ayurvedic and unani systems of medicines; and its deep-rooted place in the folk life of the country. Articles pertaining to such research put up in an interesting way will constitute an important aspect to be covered by the journals.

To our readers, local organisations spread all over the country and the various individuals, our submission is that on their patronage would ultimately depend the success of our venture. The Gosamvardhana Journals are the only journals attempted to be brought out on a scientific basis for the progressive development of our bovine wealth. We invite you to be the regular partners in the preparation and presentation of the journals and take these as your own. In fact what you need can be best known only from you. We shall look forward for suggestions from you for the improvement of the journals, questions relating to the practical problems in the field and other such matters. The subscription you send to us, is further invested at this end, for the furtherance of the cause of the cow that has been in a state of neglect for long in the country on economic level.

We hope that our learned contributors will help us in making the journals inspiring, informative and interesting ; and our esteemed readers would generously patronise our journals by sending further subscriptions and spreading the knowledge to others on this vital problem.

By : Dr. R. N. Govindaswami

FACTORS AFFECTING quality and quantity of MILK . . .

THE yields of milk of an individual cow fluctuate, from milking to milking, from day to day, and differ in any year from the yields of the preceding or subsequent years. Changes in the percentage butterfat content (test) and also in the amounts of other components of the milk frequently occur. In many instances the cause and frequency of these changes is not understood and leads to disputes between buyer and seller.

Inheritance

The cows within any one dairy breed differ widely among themselves in their productive capacity because of differences in their inherited capacities. Some animals have inherited a strong stimulus to produce milk while others possess this stimulus to lesser degree. In cattle it is good inheritance that provides competence to yield large amounts of milk and butterfat. If the cow has inherited from her ancestors the ability to eat large amounts of feed and, therefore, yield a large quantity of milk, she is a competent dairy animal. Production results when the animal with good inheritance is given a favourable opportunity, and the level of her production is determined by her ability to respond to that opportunity. On this fact many breeds of dairy cattle have been developed in foreign countries through hundreds of years of careful breeding and selection for cattle capable of producing high milk yields. The beef cattle and dual-purpose breeds have been developed with different objectives and do not have the inherited capacity for high milk yields which typify high-grade and purebred animals of the dairy breeds. Therefore, if milk yields in India are to be stepped up and the envisaged dairy scheme of the Third Five Year Plan with an outlay of about Rs. 36 crores have to be successful the purpose of breeding should be specific.

Age at Beginning of Lactation

The milk yield of a normally increases until maturity of the individual is reached (at the age of 5 to 6 years) and remains about stationary or increases slightly for 2 or 3 years. For most dairy-cattle breeds, maximum yields are obtained at about 7 year's of age. After 8 to 10 years of age, yields decline slowly. The test of a cow's milk changes but litlte with age, except that after 10 years of age, it declines slowly. The test of cow's milk during her first lactation period is a

good index to the test during the remainder of her life time.

Single Or Multiple Births

Giving births to twines or triplets is more of drain on a cow's vitality than the birth of a single calf. Hence, the milk yields for the lactation which begins with multiple birth may be less than in cases where there is but a single birth.

Health And Vigour

Strong, vigourous, healthy cows produce more milk than do cows which lack vigour and are suffering from some ailment. Mastitis, a disease frequently encountered in dairy herds, is likely to reduce milk yields greatly. The disease also is responsible in many cases for blind quarters, that is, the drying up of one or more quarters of the udder. When one or more quarters of an udder cease to function, the remaining normal quarters may compensate somewhat for this loss but the total production of the cow is markedly reduced because of the udder defect.

Length Of Lactation

The number of days during which a cow produces milk greatly affects total yield. Calving intervals 12 months in length, that is, the production of a calf once a year, are advantageous from the standpoints of (1) large total lifetime yield of milk, (2) enabling the farm operator to take advantage of favourable seasonal market prices for feed and milk, and (3) facilitating the farm work programme such as planning, care and harvesting of crops.

Season Of Calving

Cows calving during winter months usually produce higher annual yields of milk and butterfat than do cows calving in late spring or summer. The appetite of cows are generally best during cold weather. The stimulus of spring pastures helps to maintain milk yields of cows calving in early winter at a high level, whereas in the case of cows calving in summer this aid comes too late in the lactation period. Hot weather depresses the appetite presumably because cows have difficulty in giving off the surplus heat from their bodies. Conditions of high relative humidity make matters worse. During such periods, cows may eat much less than usual and milk yields may fall rapidly.

Stage Of Lactation

When high-producing cows are given proper care their daily milk yield tends to increase gradually until it reaches its maximum height 3 to 6 weeks after calving. From that point, the daily yield gradually declines. It is said that about one-eighth of the year's yield is obtained during the first month after calving while during the tenth month only 6 per cent of the annual yield is produced. The decline during the last 4 months is more rapid than during the early part of the lactation. The test of milk follows a trend opposite to that of the milk volume.

Number of Days Calf is Carried

Beginning about the fifth month of gestation, hormones depress milk secretion, causing the milk yield to decline more rapidly during the latter part of the lactation than during the early part.

Length of Rest Period

The longer the rest, or dry period, within reasonable limits, the larger is the milk yield during the subsequent lactation. An adequate rest period permits a cow to restore mineral, vitamin, and tissue reserves which may have become depleted as a result of heavy production. Under good conditions, rest periods of 6 to 8 weeks are usually ample. A rest period of 60 days is commonly allowed if cows calve at 12-month intervals.

Milking Factors

The skill with which the milking operation is carried out and the conditions surrounding the cow at the milking hour

had been the subject of much research in the universities. Some of their results are as follows.

Hormones : The development of the mammary gland and some of the most important factors governing milk secreation are controlled by hormones. The role of hormones in these processes and ways in which man can take advantage of their effects in enhancing yields of milk are already explained.

Number of Dairy Milkings : The number of times that cows should be milked daily is best determined for the individual cow. Some practice milking the highest producing cows three times daily for the first 60 to 90 days of their lactation period and then only two times daily. In deciding upon the practice to be followed, consideration must be given to the question, if the extra milk obtained from three milkings as compared with two milkings pay for the extra labour and feed. Experiments have been said to have demonstrated that increasing the number of milkings per day in high-milking cows (1) increases the daily yield of the cow and (2) tends to make the cow more persistent in later lactations. High-producing cows, especially those with small udders, yield up to 20 per cent more milk when milked 3 or 4 times than when milked twice a day. In cases of high-producing cows with high congested udders, especially during the period immediately following calving, frequent milking is necessary in order to relieve the pressure in the udder and thus prevent injury to it. There is not much gain in yield through frequent milking of low-producing cows.

The chief factor governing the quantity and composition of milk is inheritance, technically called the gene. Therefore, the primary function of the public and private sectors must be to breed cattle in India with a specific purpose of producing dairy type of cattle and step up milk production.

Rapidity and Completeness of Milking : Experiments have shown that rapid and through milking is effective in maintaining milk yields at higher levels than when milking process is unduly prolonged or done in a haphazard manner. Rapid milking is conducive to a good hormonial response as already explained. When considerable amounts of milk are left in the udder at milking time, the cow tends to secrete less. In fact, this is the procedure commonly followed in drying off cows.

Punctuality : Milking at regular hours helps to prevent fluctuations in yields and test. Milking cows exactly at the same hour each day aided materially in keeping yields and test constant. Moderate changes in milking hour, did not change the total daily yield of milk and butterfat.

Management : Quietness, kindness, gentle handling, and regular care are factors in management which influence milk yields. Excitment caused by rough handling, being chased by dogs, or fighting of the animals, is likely to reduce yields.

Cows suffer from extreme heat as well as from extreme cold. Provide shade trees or covered shed open on all sides and give the cows access to the shade for several hours during the hotest part of the day in extreme weather.

Feed :

The amount and character of the ration are among the most important factors influencing milk yield and composition.

Heavy-Feeding

Liberal feeding of well-balanced ration is necessary for the securing of high milk yields. Feeding more than the needed amount does not increase the yield beyond the capacity of the cow to produce but such a procedure may influence the test of the milk for a time. Liberal feeding prior to calving to the extent that the cow becomes fat usually induces a

somewhat higher than usual milk yield and a considerably higher than normal test for a short period at the begining of the lactation. As a rule, a highly fitted cow loses weight rapidly following calving and the test returns to normal within a few weeks.

Under-Feeding

Extreme underfeeding for an extended period is likely to be disastrous in its effect on yield and test. Under such conditions cows lose weight and both yield and test of milk fall. With prolonged underfeeding, which sometimes occurs when pastures are dried up, both fat and other solids decline below normal in amount. The use of suitable suppliments of grain mixture or hay, or both, aids in preventing these abnormal effects on yield and composition and in correcting them once they have occured.

Composition of Feed

The dairy cow possesses the ability to keep the percentage of fat and other solids of her milk nearly constant in spite of wide variations in the kind, amount, and composition of the feed she consumes. changes may occur in the flavour and vitamin content because of feed influences. The flavour of milk may be objectionable when such feeds as cabbage, rape, and turnips are fed, or when cows at pasture eat strongly flavoured weeds such as ragweed, wild onions, and dandelions.

The Vitamin Content

The vitamin content of milk is subject to wide changes depending upon the vitamin of the ration. Fresh green pasture grass, green hay, and green silage supply large amounts of carotene and when these feeds are freely consumed, the milk contains a relatively high content of vitamin A, a colourless compound, and carotene, a yellow pigment.

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GENITAL DISEASES OF DAIRY CATTLE

by
C.B. SINGH

A COMMON cattle breeder is now acquainted with the system of artificial breeding and the extent to which it differs physically (in technique) from natural breeding. As such it is now a stage to emphasise that the system of artificial breeding, besides many other advantages, ensures security against genital diseases. In the dairy cattle, the diseases of the genital organs are prevalent all over the world. In India particularly where proper sanitation is rare even on well organised cattle farms, compulsory cattle disease testing regulations are non-existent and the plane of nutrition is extremely low, the diseases of genital organs are a much more common feature in the dairy cattle. This all results into low vitality of the cattle and they fall an easy prey to the various diseases, including the diseases of the genital organs.

The diseases of genital organs are of significant economic importance in India particularly because a cow when rendered sterile or a bull declared unfit for breeding, is not worth any money, because these can neither be profitably utilised for work nor can these be economically disposed of. Thus a sterile cattle is a burden to the owner. As a solution to this standing problem a rigid control of the diseases of genital organs is to be seriously resorted to.

Important Diseases of Genital Organs

Brucellosis (Bang's) or Contageous Abortion : It is a disease of female reproductive organs causing expulsion of the immature young one either in weak or dead condition (in about 80% cases). The retained membranes decompose and the organisms of decomposition along with the poisonous products are absorbed in the body resulting into blood poisoning and death of the animal. In cases where the animal is able to withstand the attack, the uterus continues to harbour the organisms. The walls of the uterus become thickened and hard, the lining membrane becomes eroded and conception becomes impossible. In case overies become infected, these lose their function. Thus the animal becomes sterile.

The abortion can take place at any stage of pregnancy but the most common occurrences are noticed during the 5th to 7th months of

pregnancy. The causal organism is Brucella Abortis. The mode of transmission from one animal to the other is either through the ingestion of infected material or through the male organ of the bull during the course of natural service. This disease is also communicable to human beings through direct contacts with the infected animal or through the use of milk produced by the infected cow.

There is no specific treatment for curing the disease. Only preventive and control measures need to be resorted to. All positive reactors should be segregated and the premises should be disinfected. The cow should not be bred for 2-3 heats at least. Retesting should be done and those animals proving positive and uneconomical should be disposed of, preferably to Gosadans. Calf-hood vaccine (strain 19 vaccine) should be used for producing resistance.

Although proper sanitation and disinfection of premises is quite a source of prevention of further spread of the disease yet the sanitary measures cannot prove of any help in checking the disease if the bull is used through the course of natural service. The bull so infected by the infected cow, in turn, infects other healthy cows which they serve.

In order to avoid the transmission of the disease through the bull, the method of artificial breeding should be adopted. This will eliminate all chances of infection through the bulls as well as from the infected cows. By the system of artificial breeding the infected cows do not come in direct contact with the bulls, nor do the infected bull come in direct contact with healthy cows.

The economic losses caused by this disease are substantial. During the year 1947 in the U.S.A. due to Brucellosis infection in the herds the calf crop was reduced by about 40% and one cow out of every five suffering from this disease might have become sterile. There was also a reduction in milk production by about 20%. According to the official survey made, during the year 1947 in the U.S.A. by testing 1,321,445 cattle, 58,525 or about $4\frac{1}{2}$% were found reactors. On the basis of this trial it was estimated that there was about one and a quarter million infected cattle in the U.S.A. during the year under report.

It will thus be seen that even in the U.S.A. where these strict sanitary measures are enforced and quickest method of disposal of useless, uneconomic and diseased cattle through slaughter are practised, the incidence of Brucellosis has been somewhat frequent in animals serviced through natural course (by the bull directly). In India where natural service is predominant and sanitary control measures are not in existence, the bull, during the course of natural service, is an important source of transmission of the disease of Brucellosis among at the dairy cattle. Under such conditions, the system of artificial breeding would go a long way in reducing the incidence of Brucellosis in the dairy herds in India.

Vibro Foetus : Although the disease caused by V. Foetus is of two types, i. e. V. Foetus venereals and V. Foetus Intestinalis, but here we are concerned only with the former type. This is a disease second to Brucellosis in causing abortions in dairy cattle. In some Brucellosis free herds occasional abortions or low conceptions have been noticed. The abortions usually take place within first 6 months of pregnancy. This is sometimes attributed to the infection of Vibro Foetus which is a spiral-shaped germ and is responsible for abortions and retention of placenta in pregnant cows. Losses due to Vibro Foetus in the U.S.A. have been regarded second to the losses caused by the disease of Brucellosis. Vibro Foetus infection persists for long time after abortion and, therefore, severe financial losses

are caused not only because of abortions but also because the rate of conception is reduced and the animals do not conceive on account of the continued infection of Virbo Foetus. Thus the total financial losses due to non-conception are regarded as much as due to abortion by this disease.

Positive agglutination tests are obtained usually at the time of abortions. Experienced Veterinarians can help detecting the disease by conducting pregnancy diagnosis tests within 90 days of service. Abortions that take place within 3 months and in which cases the embryo is intact with the membranes, are usually due to the infection of Vibro Foetus. Along with the examination of Foetus, the blood of the animal should also be tested for the germ Vibro Foetus vithin 14 days after abortion.

Control of Vibrosis (*V. Foetus Venerealis*): Get the cows tested for pregnancy and sterility by an expert, particularly in the early period of pregnancy.

Since abortions and sterility due to this disease are likely to be confused with other diseases laboratory tests should be carried out.

Test the blood of suspected animals and also of those that are newly added to the herd and those found positive should be segregated.

In certain cases even after the tests have shown negative results, Vibro Foetus—germs have been found in vaginal mucous.

In case of bulls the organisms are found in the sheath of the penis.

Artificial breeding should be practised all over, and particularly in suspected cases of infection with Vibro Foetus.

Use Antibiotic Treatment For Aborted Cows

All antibiotics such as, Pennicillin, streptomycine, aureomycine and sulphanilamide to semen diluents in the semen collected artificially. In recent experiments it has been found that if semen is diluted at least 1:25 in yolk citrate containing 500 units of pennicillin and 500 micogrammes of streptomycine per millilitre and held at 5° (for at least 6 hours before use, infection is not transmitted. Thus it is stated with certainty that antibiotic treatment and particularly the treatment with streptomycine, materially reduces the risk of transmission of infection (McEntee, Gilman, Hughes, Wagner and Dunn, 1959). The organism does, however, survive on some season both in semen stored at—79° (FAO report, 1954) and at 5° C.

In the bull promising results have been obtained by local antibiotic or antiseptic treatment of the penis, prepuce and terminal position of urethra. Encouraging results as reported to have been experienced by the local use of aeridine derivatives.

Trichomoniasis: It is another parasitic disease of genital organs, caused by a tiny parasite called "trichomonas foetus" which is a single called organism and lives only in the reproductive tracts of cows and bulls. It is a real venereal disease and is not spread by normal contacts. The sexual inter-course is the chief source of infection in both the males and females. In the U.S.A. this disease is common all over the country. Although no intensive work has been done in India yet instances of infestation with this discease are seen in a few cases.

There is no infalliable method of detecting trichomoniasis in a bull or cow. However, semen samples and sheath swabings in the case of a male and some whitish discharge from a female or the examination under microscope of aborted foetus or after-birth, do indicate the infestation in majority of the cases. The infected bulls apparently show no signs of the disease as they continue to breed unhesitatingly and there is no effect upon the quality,

quantity or breeding efficiency of the bull. The females may either fail to settle or the cow may abort throwing a dead calf or the dead calf may be retained in the uterus. In the last case the cow does not return to heat, and the cow behaves like a normal pregnant cow; although large quantities of pus is accumulated in the uterus resulting into pyometra.

The bull continues to harbour the disease life long, and rest, as in the case of female, does not help in his case. Since the treatment of a bull is expensive and time consuming, only most valuable bulls should be treated; while the average bull should be discarded from service. Regarding the female herd, the entire stock should be tested and graded as clean, infected and doubtful. The clean ones should be kept separate and the semen of only disease free bull should be used for insemination. All other infected ones should be given 2-3 months rest after calving or abortion as the case may be in case of pyometra (accumulation of pus in the uterus). After the pus has been discharged and the cow has emptied, a douche with antiseptic lotion be given and the cow be given rest for 60 days before insemination; while the doubtful cases should be tested again and kept under observation till they have calved clean and the after-birth has shown negative results for trichomoniasis.

Prevention of the disease mainly lies in keeping the clean herd separate from the infected ones. New bulls should be tested before use in the herd, and artificial breeding alone, should be adopted. This will minimise the chances of infection to all possible extent; and will help a great deal in keeping the herd clean and reduce financial losses considerably.

Vaginitis : According to the knowledge available at hand, this disease is caused by a specific Gram negative streptococous or a virus but full facts regarding its mode of transmission and causes etc., still remain to be investigated.

In the case of a cow it commonly refers to the presence of small pimples or nodules located on the inner lips of vulva and around the clitoris. The size and the number of these pimples depends upon the severity of the disease. In advanced cases there is a swelling of the vulva which on opening will exhibit slight pus containing lesions and the inner surface has denuded areas. Very few animals are free of a nodular lesions. The number of these lesions and their size in most of the cases increases after the service of the bulls. Experience has shown that fertility is generally not affected in mild cases of infection with this disease.

In the case of a bull also similar lesions, as in the case of cow, are visible in the region of the glands or the point of the penis and the mucous membrane of the prepuce. The condition of the disease may be mild or severe

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depending upon the extent of infection. The source of infection in a bull is usually the infected cow at the time of natural service, although the virgin heifer or the young bull also, at times, is found to be having the lesions of vaginitis.

In fact, no statistical data is available at hand to prove the economic significance of the disease of vaginitis yet it has been observed that in cases of severe infection involving the inflamation of the vulva with lesions containing pus the cow is hard to settle in calf because the ovum perishes easily and the sperm is not capable to fertilize the ovum due to the pathogenic condition of the genital tissues. Thus the cow is rendered temporarily sterile and the bull unfit for breeding.

In case of mild infection of the cows, the use of the system of artificial breeding is of immense advantage as the bull gets no infection and the chances of injury to the lesions are greatly minimised.

This disease, in any case, should be got rid of by due care and treatment, preferably in early stages. Its simple treatment involves the local washes in the form of irrigation with (a) 2 to 3 spoonful of salt per gallon of water (hot as hand can bear) to be used two to three times per week (b) use of Potassium per manganate just strong enough to tint water purple, (c) a solution of table salt and baking soda one table spoonful each, in a gallon of warm (boiled) water. This treatment though apparently simple, is as affective as stronger douches.

Chronic Metritis : It is the inflammation of the womb of the cow. In this case the cow, after two to three days of calving, throws purulent genital discharge and masses of pus. The rectal temperature shoots up by 1 to 2°. The animal feels weak. Some animals recover within 2 days or so; some die out; while others turn into chronic cases terminating into leucorrhaea. In worst cases there is (1) local septic infections and ulcerations (2) gangrene of the parts (3) general septicaemia, and (4) inflammation of the womb, causing coagulation of blood.

The breeding of chronic cases directly by the bull (natural service) results into the transmission of the disease from one cow to another, as there is no complete cleaning or sterilisation of the male organ (penis) of the bull; while in the case of artificial breeding, the chances of transmission of this disease are reduced to minimum provided sanitary conditions are maintained.

After infection, the womb should be flushed thoroughly with warm salted water to remove the collection of a fetid material. The uterine passage should then be irrigated with mild antiseptic solution, such as 0.5% lugol's solution, or, like the one used for cleaning after the expulsion of after-birth. Thereafter when the animal has reverted to normal condition of health, the cow should be bred artificially, and not by natural service, because in case of natural service, there are chances of transmission of infection from the cow to the bull, and from the bull to other cows, and so on.

Under Indian conditions where all the cattle are not regularly tested for contagious and infectious diseases, particularly for diseases of genital organs, and the cattle (both males and females) are prone to infection because of poor sanitation and low resistance, the adoption of artificial breeding practice in cattle shall go a long way in minimising infection and arresting losses. Experience has shown that valuable cattle are rendered sterile merely through slight carelessness of breeding them with local scrub bulls, many of which carry the germs of genital diseases. The elimination of scrub bulls is a long going process and may take many years where-after breeding with pedigreed bulls, through the system of artificial insemination, will be universal in this country.

A HEART TO HEART TALK
BY THE CHIEF EDITOR

PRACTICAL ASPECTS OF COW-KEEPING

AFTER understanding the importance of cow-keeping from the cultural, economic and science points of view, we have to see if cow can stand as a really useful being in the practical life of the society.

In India, one of the reasons for which cow-keeping has been attached so much importance has been—she gives us bullocks that are used in agriculture and as a means of transportation. According to the census of 1956 there are about 6 crores of bullocks in the country and about 37 crore acres of land under cultivation.

Most of the agriculture is done with the help of bullocks. In the country in 1956, there were only 2100 being used on the farms; this further proves that agriculture has to depend on bullocks primarily.

Some people feel that in due course of time our agriculture is going to be mechanised; there would be bigger land holding, cooperative farming would be encouraged and there would be no place for bullocks. Let the science progress, we do not object to it. However, in this context there are certain basic questions which have to be taken into consideration.

(1) About 25 crore of people are engaged in agriculture and it cannot be said that their conditions are satisfactory. Some people earn their livlihood even by lending their bullocks to others. With the introduction of mechanisation these persons will also be deprived of any source of livlihood. This should be one of the foremost duties of the Panchayats to provide employment to all able-bodied people in their areas. Just by giving doles, the problem of unemployment cannot be solved.

(2) The issue of fixing ceilings on land holdings is also being actively considered. In these circumstances, the place of heavy agricultural implements has to be considered.

(3) While thinking of cooperative community systems of farming, the welfare of the peasants has to be kept in view.

(4) The availability of required capital for the mechanisation of agriculture and also other developmental activities have also to be kept in view.

It would be difficult to estimate the price of 6 crore of bullocks being used in the country.

According to a rough, but moderate, estimate of about Rs. 250 for one bullock, these would cost Rs 1850 crores. These bullocks have been reared on agricultural land; about Rs 250 crores are invested in bullock carts and vehicles pulled by bullocks. In order to use tractors and bring mechanisation of agriculture, on the basis of one medium size tractor for about 100 acres of land, we should need approximately 67 lakhs of tractors and included with this amount of Rs. 24,000 for other parts of tractors, we will have to arrange a capital investment of Rs 625 crores. Either these tractors have to be imported or factories made within the country. Capital would be required for this. In spite of this the bullocks would continue to be there and to what alternative use these would be put. Does it mean that the living capital of the country will have to be wasted ?

Let us think about other recurring expenditure on tractorisation and the position of cow and bullocks in this regard.

The feed and fodder required for cattle is available from the fields. Smaller agricultural implements can be locally and easily prepared. But for tractors, factories and workshops will have to be created and petrol or other necessary fuel will be required. The present-day agriculture does not require so much of new, specialised and highly technical knowledge. With the introduction of mechanisation, it would be difficult for a normal peasant to look after the machines and intricate implements.

If an ordinary tractor tilling 200 acres of land is used, for 1000 hours in an year, and an annual expenditure of about Rs 2000 will have to be incurred on oil and other things. About Rs 1000 more will be required as recurring expenditure on its repairs etc and this has to be multiplied for 37 lakhs of tractors. In the present circumstances the normal endurance period of a tractor could be taken as five years, That means that about 5 lakhs of tractors will have to be arranged every year.

The farmer working with bullocks supports himself and also his bullocks with the agricultural product he gets from the land. Not only that the bullocks provide with the necessary manure. About 6 crores of bullocks provide us with 375 crore tons of high quality manure and this is an important contribution in increasing in crop yield. This excludes the the manure that could be made available with their urine and carcasses.

This analysis should not at all be interpreted as if there is no place for machines in our country and that we want everything to be done only by bullocks. There is a place for machines in the country and with the progress of the science it should be so. We only intend to emphasie this fact that while introducing mechanisation several factors have to be taken into consideration. We shall have to assure that the machines should be complimented to the bullocks and not their murderers. In the present day conditions till most of the people have to depend on agriculture we have a small scale farming, availability of only limited capital and the capitalists is not prepared or interested in investing his capital in the field of agriculture—the fundamental basis of agriculture will contine to be bullocks.

In spite of this importance of the bullocks, we shall have to accept that their condition is very poor. They are not of good quality, semi-starved. In order to improve their conditions it is imperative that our cows should be of superior quality and the cow keeper in the country should be prosperous. Healthy bullocks cannot be expected from the neglected cows of the poor farmers. If there are not good bullocks, the agriculture cannot be

improved. Consequently the problem of food would remain unsolved in the real sense and our farmer cannot be really happy. Therefore, there is a great scope for doing several things.

Let us study our local conditions and see where and in what way the improvements can be made. That much is definate that the agriculture in India cannot be improved while neglecting the bullocks.

The cow and milk production

IN our country, milk-production is considered to be an integral part of animal husbandry. There are the largest number of milch animals in this country, still milk is not available in requisite quantity. An individual gets the amount of milk at an average which is much below the normal requirements of an individual according to nutritional experts. According to the census of 1951, out of the total production of milk in the country, 39.2 per cent of this is consumed in liquid form by drinking, about 4% is converted into ghee; and 8.8 per cent is used for making curd. About six percent is utilised for butter and 4.3 per cent is used for *khoya*; 9 per cent for milk ice-cream and 7 per cent is used for preparing cream. Only the remaining 4 per cent is used for preparing other things, such as sweets etc.

For milk, cows, buffaloes and goats are reared in our country. Their present milk-giving capacity is very low as a cow gives only about 382 lbs. of milk per lactation and a buffalo about 1,117 lbs. while a cow gives 7848 lbs. of milk per lactation in Denmark, 6438 lbs. in Germany, 6393 lbs. in Great Britain and 5512 lbs. in the United States of America.

In this context, as for the question of goat keeping is concerned, it is obvious that it leads to the erosion of land, sometimes to the extent of changing green pastures to to deserts. The goat keepers normally don't have land and grazing tracts of their own. Sometimes, the crops are also adversely affected. Goats milk has no place from the commercial point-of-views. Those who want to keep a goat in the village should think in a different way so that the goat can be kept only at home and not allowed to go here and there in the fields. In my opinion, goat-keeping cannot be profitable and practical for meeting the requirements of milk consumption.

In the sphere of milk production, we admit that the importance of buffaloes is increasing. The buffaloe's milk has more of fat contents and because of its being more heavy, it is easier to mix water in buffalo's milk. But the expenditure on the maintenance of buffaloes is much more as compared with the expenditure on the cow. The buffaloes are more prone to diseases than cows and their male calves' death rates is also more than cows'. Apart from this the male calves of buffalo have been proved as not useful for agriculture purposes. The question of nutrition value of milk is there. The new researches in the field of nutrition have proved that the fat contents in milk more than a specific proportion are not only not essential for health but are rather harmful for it. Therefore, there would be no problem of the non-availability of fat contents to a very high percentage in the cow's milk. In such circumstances, neither buffaloe's nor goat's milk can serve our purpose.

As far as the cow's milk is concerned, it can be said almost with certainty that it is the best from the point-of-view of ingredients. But the problem is how can the vast problem of the availability of milk in increasing quantity be solved only with cow's milk.

Cow-keeping is a necessary part of the most important profession of the people i. e. agriculture. By cow-keeping, not only milk but the bullocks are also provided that are the basic motive force of our agriculture. Two things have to be specifically kept in view while purchasing a cow. The first is that the cow should yield milk in a good measure and that we get good bullocks from the cows. The cow that cannot serve our both of these purposes, is no good for us—not useful for our country. Some people advocate the cause of buffaloes for milk. In fact they do so without understanding the objective conditions prevailing in our country. As for the supply of the milk is be incresed this can be done by improving the breeds of the cows. Their better care, better management ,and our planned approach to develop the cow and her progeny would immediately double the milk-yielding capacity of the cows.

The question is of doing this with a spirit of dedication and utmost sincerity.

—Y.M. PARNERKAR

THE FIRST MEETING OF THE

Rajasthan State Council of Gosamvardhana

THE first meeting of the Rajasthan State Council of Gosamvardhana was held on the 27th of December 1961 at Jaipur. The Council was inaugurated by Sri Shriman Narayan, Member, Planning Commission. He emphasised the role of cattle as the basis of India's agricultural economy.

Speaking on this occasion, the Chief Minister of Rajasthan, Shri Mohanlal Sukhadia praised the vital role being played by the voluntary workers in the field of GOSEVA—the development of the Cow. Shri Sukhadia felt that the Cow was essential for the real improvement of the conditions of the peasants. He suggested that the Rajasthan State Council of Gosamvardhana should secure cooperation with the Panchayat Samithis also for the furtherance of its work. The meeting, adopted the policy statement of the State Council. In the policy statement, the State Council made a reference to the policy statement of the Central Council of Gosamvardhana adopted at Mount Abu in June 1960. Elaborating the recommendations in the said policy statement as applied to the conditions in Rajasthan, the State Council's policy statement said that "the Cow has to be encouraged—by providing the entire market for fluid milk and milk products, which admittedly is the only way of encouraging, improving and stabilising the Cow." The State Council in this further resolved that:—

"All our efforts have to be directed towards the stabilisation and improvement of the breeds of cows which can alone fulfil our needs in draught as well as milk. Along with this the infiltration of buffaloes have to be discouraged by every possible means the most important of which is that no Government assistance should be provided for encouraging buffaloes.

The State Council of Gosamvardhana, therefore, proposes that:—

(a) *In all the dairy schemes, Government assistance should be given only for the improvement of milk production in cows in rural areas and its economic marketing in urban areas.*

(b) *All the cattle breeding farms in the State should cater to the needs of the breeders engaged in the rearing and improvement of cows.*

(c) *The Jaipur and other milk supply schemes in the State should handle cows' milk alone with the ultimate aim of stabilising the cow in the expanding economy of the State.*

(d) *To hasten the rehabilitation of the cow all the assistance in any form like loans, subsidies, services, marketing etc. should be given to the Cow only."*

CATTLE HUSBANDRY IN THE NAGPUR REGION

REPRODUCED BELOW, FOR THE INFORMATION OF THE READERS, IS A SHORT ACCOUNT ENUMERATING THE SALIENT FEATURES OF THE ACHIEVEMENTS WITH REGARD TO CATTLE HUSBANDRY IN THE NAGPUR REGION.

Veterinary Dispensaries and Veterinary Aid Centres :

AT the start of the first five year plan there were 55 Veterinary Dispensaries and 33 Veterinary Aid Centres which were rendering veterinary aid in this region. During the first five year plan period, 13 additional Veterinary Dispensaries and 55 Veterinary Aid Centres were opened in the region, making a total of 68 Vety. Dispensaries and 88 Veterinary Aid Centres at the end of the first five year plan. During the second five year plan period, 10 Vety. Dispensaries and 88 Veterinary Aid Centres were opened, thus having a total of 78 Veterinary Dispensaries and 176 Veterinary Aid Centres at the end of Second Five Year Plan.

During the second five year plan period, a comprehensive scheme for the construction of buildings for taluka and branch type dispensaries was sanctioned by Government. Under this scheme 10 taluka type and 18 branch type dispensaries were sanctioned for the Nagpur Region. The work of construction of buildings for the dispensaries was started during the year 1960-61. The work of construction of buildings for three taluka type and dispensaries three branch of type dispensaries was completed before the end of the second five year plan period and of the remaining dispensaries was in progress.

Eradication of Rinderpest :

Rinderpest Eradication Scheme centrally administered was launched in this region during the second five year plan period for the protection of bovines against the deadly disease 'Rinderpest'. 60% cattle and buffaloes were protected against this disease.

Disease Investigation :

A full fledged laboratory was in operation at the start of the first plan and also at the start of the second five year plan. There were two officers, one for cattle, sheep and goats designated as Deputy Director Disease Investigation, and other for Poultry designated as Assistant Disease Investigation Officer (Poultry). The same two officers were working during the former period of the second five year plan, two officers were working in the

same capacity for the Nagpur Region who were designated as Assistant Disease Investigation Officer, for Cattle and Sheep and Goats and Asstt. Disease Investigation Officer (Poultry). There main job was to tour and investigate diseases of known and unknown origin. Materials collected by them and received at the laboratory were examined and tested and results were communicated to the concerned with necessary advice for the control of diseases of contagious and infectious nature as well as for diseases of other nature.

Cattle Breeding Farms :

At the start of the first five year plan, 3 Cattle Breeding Farms were functioning at Telankhedi (distt. Nagpur) Metikundi (Distt. Wardha) and Bod (Distt. Amravati). During the first five year plan, 4 Dairy Farms Units were opened at Chanda, Yeotmal Borgaon (Akola) and Porha (Distt. Amravati) to meet the demand of milk and to produce good pedigree bulls for development of cattle. These Dairy Units were transferred to the Animal Husbandry Department at the end of the Second Five Year Plan. They were recently converted into Cattle Breeding Farms. The object is to produce the best pedigree bulls and supply to the Artificial Insemination Centres, Key village Centres, Units and Blocks as well as to the persons interested in cattle breeding for the development and improvement of cattle of the local non-descript breeds.

Key Village Centres :

At the begining of the first five year plan 9 Ex. M.P. State Pattern Key Village Centres were functioning. During the first plan period, 27 more Key Village Centres were opened. Bulls of the Gaolao and Hariana breeds were located at the Key Village Centres and found about villages for upgrading the local cattle. During the second five year plan, 10 such Key village centres were opened, making a total of 6 centres at the end of the second five year plan period.

During the first five year plan period, 4 Govt. of India pattern Key Village Centres were opened. In the second five year plan period, 8 more Key Village Centres have been opened, making a total of 12 centres at the end of the second five year plan. The object of these centres is to upgrade the livestock by resorting to both the methods, i.e. natural and Artificial, the latter being the method for rapid improvement of cattle.

Goshala Development Scheme :

This scheme was implemented in this region, during the second five year plan. According to the target fixed, 8 Goshalas were to be selected under the scheme upto the end of the second five year plan period, Six Goshalas at Gondia, Amravati, Nagpur, Wardha, Akola and Khamgaon were selected and given financial assistance. During the year 1960-61, two Goshalas were to be taken up to fulfill the target of 8 Goshalas. The financial assistance to these private Goshalas was given for improvement of Livestock maintained by Goshalas.

Establishment of Gosadans :

During the first plan, two Gosadans were sanctioned for this region. One Gosadan at Sillari in Nagpur District was opened during the first plan and the other Gosadan at Somnath District Chanda was opened at the end of the Second Five Year Plan. Private Gosadan run by Goshalas were given financial assistance @Rs. 18/- per animals per year. Gosadan at Kurha District-Amravati run by Goshala Amravati was given subsidy during 59-60. Another Gosadan run by Goshala Nagpur at Pendhri District Nagpur was given financial assistance from the 1960-61.

Livestock Research Station :

During the second five year plan period, a begining was made to establish a Livestock Research Station at Nagpur. The object of establishing this station was to find out the economic utility of the particular breeds of animals and also to note and study the capacity of matabolism of particular type of breed for production of milk and for draught. During the year, 1960-61, Government have accorded sanction for the construction of buildings for the Livestock Research Station. The Construction work was taken up by the P. W. D. ●

by T. Narayanan

Production Recording in Dairy Farms in the U.S.A.

RECORDS of production of dairy cattle is a primary requirement to base selection of stock and also to evaluate breeding value of animals. Unfortunately in our country the importance of recording milk yields of cows and buffaloes is almost unknown to our cattle breeders in rural areas. Such a lack of reliable records on production of our dairy cattle has been a great obstacle in any attampt to evaluate the level of production at any given time and also in assessing the improvement or otherwise in the genetic merit of dairy cattle through a period of time as a result of specific cattle development projects in various areas. Whatever information is available about the productivity of our breeds dairy cattle is mostly based on collection of records maintained at Military or governmental farms. It is quite evident these animals maintained in a better environment and breed under scientific system of mating do not reflect the true merit of these breeds as they exist under rural conditions. Therefore, the desirability of popularising milk recording on a national scale was rightly considered at length at the Gosamvardhana Seminar held at Mount Abu in June, 1960. Even though the Seminar felt that time has not yet come for launching any large-scale programmes, it emphaised the need for initiating milk recording work in selected areas under Key Villages, Cooperative dairy development projects, breeding tracts etc. It is, therefore, felt by the writer that it will be advantageous to know in detail about the various methods of production, recording and testing followed in advanced countries which have in no small measure contributed towards phenomenal increase in the production level of their dairy cattle. In the following note an attempt has been made to outline such system adopted in the United States, with a view to induce others who have studied this aspect of work in other countries like Denmark, New Zealand, United Kingdom etc. to make available to us information on systems of recording successfully followed in those countries.

Among the various reasons attributable to the present day development observed in the production of dairy stock of the U.S.A. their system of recording occupies a prominent place. The industry, the breed associations and the National and State Dairy Extension Department have played a major role in educating the dairy farmers on the importance and necessity for regularly estimating the production levels of their herds. An average dairy farmer is quite aware of the fact that for conducting his

business on an efficient basis, he should have accurate data on the feed given to his cows and the amount of milk and butter fat which they produce in return. To enable and assist such dairy farmers to maintain records properly and also evaluate them to be of use in improving the genetic merit and the production capacity of their herds a number of programmes for production recording of dairy stock have been brought into vogue by the Extension Departments both for grades and pure bred herds and by various breed associations only for pure bred registered herds.

Dairy Herd Improvement Association

It was realised quite early that even though the dairy farmers are interested in keeping production records they were unable to do so systematically year in and year out because of interference of other work in the farms particularly during harvest and marketing seasons ; and the need for this work to be done by another agency for them was felt and this formed the genesis of the present-day D.H.I.A. programme in the U.S.A. That such a service could be organised on a cooperative basis was first shown in Denmark where the first Cow Testing Association was organised in 1855 and it grew rapidly popular in that country and other northern European countries. It has been admitted that these associations, more than anything else, are responsible for the rapid development of dairying and improvement in production levels of dairy cows in these countries. In the U.S.A. the first Cooperative Cow Testing Association was started in Fremont, Michigan in 1905. These were renamed later as the Dairy Herd Improvement Association.

The Dairy Herd Improvement Association is an organisation of about 26 dairy farmers who cooperatively employ a trained person (called the Supervisor) to keep milk production records of all their cows, test them for butter fat and determine the cost of the feed used. The dairymen usually used to furnish room and board for the Supervisor while at the farm but now a days it is not much in practice. The DHIA have grown very rapidly as will be seen below.

Year.	No. of dairy herd improvement associations.	Herds on test.	Cows on test.	Average production of cows on test.
1910	40	—	25,000	5,730
1920	468	11,948	203,472	6,175
1930	1,143	27,888	507,549	7,642
1940	1,300	27,948	676,141	8,133
1950	1,973	40,000	1,088,872	9,172
1960	1,509	41,293	1,746,752	10,068 (1958)

The primary purpose of a Dairy Herd Improvement Association is to afford the members an economical method of obtaining information which they can use in improving the producing efficiency of their herds. The records of production and feed cost will enable the herd owners to spot out and cull 'boarder' or least profitable cows and select replacement stock only from the progeny of high producers. A study made by the U.S. Department of Agriculture some years ago revealed that about one-third of all the cows in the U.S.A. are kept at a loss and another one-third just pay for their keep. It can well be visualised the benefit that would accrue to the farmers if they were able to deduct and discord the uneconomical one-third. One other great benefit from these records is the proving of bulls. The records are furnished to the Agricultural Research Services of the U.S. Department of Agriculture where the information are properly tabulated and all the bulls that are used in the Association

herds are proved and the results published every month in the form of a newsletter for information. The Dairy Herd Improvement Associations are no doubt organised by the farmers but are operated as an Agricultural Extension Demonstration Project under the supervision of County Agricultural agents, and State Extension dairymen in cooperation with the Dairy Husbandry Research Branch of the U.S.D.A. As demonstration project they encourage farmers to adopt improved methods of dairy husbandry.

Procedure of Recording

The man employed to make the test is called the Supervisor of the Association. This Supervisor usually receives initial training in his duties at the State Dairy Extension Department. The procedure to be followed ragarding the identification of the animals, testing of milk production and butter fat tabulating and calculating the production of the individual cows and the herds and all other calculations related to the production have been laid down by the American Dairy Science Association and they are referred to as D.H.I.A. rules.

The Supervisor arrives at the farm about an hour before evening milking and lists all cows in the herd by name and number on the barn book sheet, identifies them from markings or ear tag numbers and obtains information on the dates when dairy cows were turned dry, approximate days when other cows will be turned dry before the next testing date, freshening dates on cows since previous test etc. He is then required to measure the grain and roughage fed to each cow and then weigh and record the milk yield of each cow in the herd and also take a well mixed sample. The recording is again repeated in the next morning and another sample taken from each cow. These two samples are mixed and the composite sample is used to test the butter fat contents. All the calculations are completed in the barn sheet and the record of production for the month is calculated for each cow. Till recently the supervisor used to test the sample and also do the calculations on the production of cows in the herds. In recent years, more and more associations have been organised on county basis and central testing laboratories have been set up where the samples are tested. Records are also calculated at these central laboratories in some cases; but the trend has been to relieve the Supervisor more and more from the work of calculations and they are now required to send these information to the State Extension Dairymen where the data are processed either by the staff or by electronic computers.

The present practice in most of the States is that the Supervisor is required to fill in the barn sheet for each herd tested and send it to the State data processing laboratory. With the help of the I.B.M. electronic computers, a monthly report is sent back to the owners showing the data for the current month and for lactation to date of milk yield, fat yield, cost of production, etc. A monthly summary is also furnished to the county agent showing similar average data for each of the association herd in the county. Likewise at the end of the year, yearly herd summary records are also furnished to the members. The annual herd summary report lists the lactation completed by each cow during the calendar years; cows are also grouped by sires and the sire's daughters average based on twice milking-305-day mature—equivalent records are furnished. In addition an annual summary in respect of all the associations within the States are also worked out. These summaries furnish information such as the number of cows in a herd, number of days in lactation, number of days dry, percent of cows in milk, total and average yield of milk and fat, the value of products, total feed cost, cost of production

of 100 lbs. of milk and profit and loss over the feed cost, etc.

The lactation production records obtained through the D.H.I.As. are also used for calculating the 305 day lactation records of each cow under test. The State Extension Department furnishes every month a list of completed 305 day lactation records to the Dairy Husbandry Research Branch of the U.S. Department of Agriculture. These are used in a nation-wide programme for evaluating dairy-cattle family lines in members' herds as to the inheritance to the animals possessed for milk and butter-fat producing capacity and also for proving the D.H.I.A. sires. As soon as the 305 day lactation records for at least 5 daughters of a sire and for the parents of these daughters are available, a preliminary proof sire record is completed for this sire by the U.S. Dairy adusbandry Research Unit. When sufficient ioHditnal dam-daughter comparisons are reported to improve the reliability of the proved sire record, this record is retabulated and this information on all proved sires is furnished every month to the members in the form of the D.H.I.A. newsletter.

Under the existing practice in the U.S.A. a proved sire record is the summary comparison of the production records of at least 10 unselected daughters of a sire and of the production records of their dams. A comparison of 5 to 9 dam-daughter comparison is designed, as mentioned earlier, as only a preliminary proof. If daughter from artificial breeding are also included at least 25 comparisons are required for proof and any comparison ranging from 10 to 24 constitute only a preliminary proof.

The Dairy Husbandry Research Branch has also made a comparative study regarding the rate of improvement in D.H.I.A. herds and all dairy herds in United States which showed that the D.H.I.A. members are accelerating the rate of improving the herds. The following table shows the yearly level of production of all the cows and the D.H.I.A. cows during the past three decades :—

Comparison of rates of improvement of all dairy herds and DHIA herds by 10 year period.

10 year Period	All Cows: Level of production at end of period.	All Cows: Yearly rate of improvement for period.	DHIA Cows: Level of production at end of period.	DHIA Cows: Yearly rate of improvement for period.
	(Pounds)	(Pounds)	(Pounds)	(Pounds)
1929-38 (Inclusive)	4,448	4	7,831	46
1939-48 (Inclusive)	5,010	45	8,675	84
1949-58 (Inclusive)	6,330	132	10,068	140

No doubt, the dairy herds in the United States are being improved at an accelerated rate but at a lower rate and at a lower level of production than for DHIA herds alone. The DHIA records have guided the members in culling, feeding, breeding and management practices and thus progressively improved their high producing herds at an accelerated rate.

Owner Sampler Recording and Weigh A Day A Month

No doubt the rate of improvement made by by the DHIA is impressive but it will be a revealing fact that in spite of the efforts of the various organisations only about 9% of the daiɹy cows are under recording by the Dairy Herd Improvement Association. It has been possible for them to introduce this system mostly among very progressive and affluent farmers only. Therefore, the dairy extension service has also evolved two more recording programmes viz., Owner Sampler and Weigh

(*Contd. on Cover III*)

Several thousand maunds of by-products annually come out from different industries which find no economic usage elsewhere. In this article, the author discusses the Nutritive Value and Utilisation of such by-products as Cattle feed.

Utilisation Of

INDUSTRIAL BY-PRODUCTS AS CATTLE FEED

by : G.S. Singh

CATTLE wealth is indeed the backbone of our economic structure. The improvement in its quality will naturally raise the social and economic condition of the peasants as also the total national revenue. Even to-day the contribution from this source amounts to variously estimated about 16 per cent of our national income i. e. Rs. 6,6400 million. Any improvement in the cattle economy is, therefore, a major contribution to our national wealth. It is now fully recognised that lack of adequate feeding is the greatest limiting factor in the improvement of the productive efficiency of our stock. A cow or bullock can not show up its potentialities unless adequate nutrition is assured. Proper feeding alone is estimated to improve the productive capacity of the cattle by 50 per cent. While such is the significance of nutrition, the available concentrate supply is adequate to feed only 30 per cent and roughage only 70 per cent of the total cattle population. The existing wide gap in the supply and requirements of nutrients has rendered the task of improvement extremely difficult.

Besides increasing the fodder production, there are many other substances available, incorporation of which in the ration, will to a great extent, improve the existing deficit. Several thousand maunds of by-products annually come out from different industries which find no economic usage elsewhere and can be tried as a feed for livestock. The oil industry, flour mill, rice mill etc. by-products are commonly utilized by peasants in the cattle dietary but besides these, there are certain other industrial by-products which

are not generally utilized by the cattle owners. This article deals about the nutritive value and utilization of such by-products as cattle feed.

By-products of starch manufactured from Maize

Owing to the increasing demand for industrial starch, a number of factories in different parts of the country are manufacturing it from maize, with maize gluten, maize grit, maize oil cake and maize husk or bran as by-products. In the United Kingdom and United States of America, these by-products are used for stock feeding. Four cattle feeds are thus obtained from this starch industry.

Attempts have however, been made by the animal nutritionists at Animal nutrition division, I. V. R. I., Izatnagar and Animal nutrition Research Section, Bharari, Jhansi to utilize these by-products as cattle-feed. Chemical composition of the by-products has been given in table I.

From the above figures it would be seen that on the basis of the protein, gluten can be compared with G. N. cake; maize cake with linseed or rape cake and grit with cotton seed and gram, moong, arher or urad-chunies. Bran is lower in protein as compared to wheat or rice bran. These by-products are poor in mineral contents particularly calcium and phosphorus except cake which is a good source of phosphorus. It is obvious that maize products being devoid of some of the essential elements cannot be qualitatively comparable to maize grain. But all these, except bran, have got much higher protein content than grain. It was therefore, thought worthwhile to include them in the cattle diet to meet up the shortage of protein, and to some extent energy also.

In order to assess the true feeding value a metabolism-experiment was conducted with flour Hariana heifers at Bharari station. The protein requirement of the heifers in all the four groups was met by the maize by-products and the bulk by wheat straw. Grit and gluten were easily consumed by the animals but they exhibited a peculiar repugnance towards maize oil cake and bran probably because the cake develops rancidity quickly and the bran too was not palatable. The animals somehow, were gradually accustomed to consume the cake when sprinkled with salted water but the animals under bran group left a major portion of their supplement even with this attempt. This necessitated addition of a little ground nut cake or linseed cake, thereby, minimising the quantity of bran. The animals did not willingly take the reduced supplement and were trained to consume the share. But when cake and bran is given as an ingredient of the concentrate mixture to the extent of 20 to 30 per cent, the animals easily consume their share. The digestibility trial was conducted and by elimination method digestibility coefficient of the organic nutrients of the four by-products were determined. From these figures their digestible nutrients have been calculated and given in table II.

The D. C. P. and T. D. N. values of the oil cake are almost equal to those of linseed cake. The digestible crude protein of grit and gluten run almost parallel to that of cotton seed and G. N. cake respectively. The same does not hold true for T. D. N. The two by-products are poor in this respect. This may be attributed to the removal of the starch. Maize bran is very poor in D. C. P. content but reasonably a good supplement of energy. In mineral content particularly calcium and phosphorus these by-products are deficient.

Studies on assimilation of nitrogen, calcium and phosphorus from these four by-products have shown that with sole gluten feeding all the three nutrients can be positively utilized

by the animals. The cake feeding exhibited a positive balance of nitrogen and phosphorus but calcium is negatively utilized. In case of grit feeding both the minerals, viz., calcium and phosphorus are negatively utilized whereas nitrogen balance remains positive. Bran feeding has shown the negative balance for all the three elements but when supplemented with linseed cake, the balances for all the elements become positive.

It may be concluded from the above findings that the animals can be maintained solely on maize products only for a shorter period provided some mineral supplement is added in case of cake and grit. Maize bran being too bulky, fibrous and unpalatable should be fed along with linseed cake or other well liked concentrates.

Although for digestible nutrients these by-products may be compared with good concentrates such as linseed cake, G. N. cake, cotton seed and grain chunnies etc. on the quantitative basis, in view of the maize protein being of imbalanced nature sole feeding of the maize by-products for a long period is not desirable. However, they can safely be used as a part of the balanced concentrate mixture in the cattle dietary.

Utility of Maize by-products for Milk Production:

The results of the digestibility trials indicate that these by-products do not differ much from common oil cakes, cereal grain chunnies etc. It now remains to be seen what action these by-products have got on milk performance and also if their inclusion proves economical to the stock owner.

Twenty identical Hariana milk cows were selected and kept under basal feeding for a month, after which they were distributed into five groups, one as control and other four groups under one of the four by-products. The requirement of protein was supplemented by concentrate mixture and the bulk by wheat straw. The constituents of the concentrate mixture in different treatments are given in Table III.

The performance of the animals was recorded and the milk was periodically analysed to see if there was any change in its constituents.

Contrary to the observation under sole feeding, all the maize by-products when mixed with other feeds were easily consumed by the animals. The average yield, per head per week during the basal period (4 weeks) has been compared in Table IV with that of the experimental yield (12 weeks).

The findings indicate that linseed cake can be replaced by maize gluten and maize oil cake. If these by-products are cheaper than the linseed cake, they can be economically used in the milch animal's ration. The production of linseed cake is also not much to meet up the requirement of cattle. Under the circumstance the by-products can easily augment the short supply of the nutrients for milch cattle. Maize grit can profitably replace the barley in the concentrate mixture. Barley cannot be easily spared for cattle as it is a staple food of the poor people in our country. Under the circumstance grit can serve the purpose of balancing the ration. Its price is also not expected to be more than barley, so its inclusion in the farm ration will be economical. With little increase of the linseed cake in the concentrate mixture maize bran can also be profitably utilized in the cattle feeding. To prepare a balanced ration with all these four by-products is not advisable, as it has already been mentioned that their protein is of unbalanced nature. If it is economical to include all the four by-products at a time for balancing the ration at least one cereal grain and one common oil cake in a limited quantity

should also be included in the concentrate mixture.

Alcohol Industry by-products :

Spent grain is a by-product of the alcohol industry and is not commonly utilized in our country as cattle feed though it does form a potential source for augmenting the supply of cereals. When its composition (Table V) is compared with that of barley, it is found that the protein percentage is almost double.

The nitrogen-free-extract has decreased to 50.39 per cent. When it was included in the ration of the growing bulls, it was noticed that the grain was quite acceptable and the nutrients were digested and assimilated fairly well. As expected, the digestibility of nitrogen-free-extract was quite low. In view of this, spent grain cannot be utilized as a substitute for barley but it can be included in the ration to the extent of 30%.

Guar-Gum Industry by-products :

A Guar-Gum factory has recently been established at Bhiwani, in East Punjab. This industry has been established to remove guar husk from whole guar grain. The husk so manufactured is exported to America where gum is extracted from it for sizing purposes. After removing the husk, guar grain is left as by-products. By milling, it is changed into guar churi or meal which is the by-product of the guar-gum-industry.

The nutritive value of this new product was not known, and consequently in the beginning it could not find its place in the cattle dietary. Recently a study was made on its nutritive value by Srivastava and Singh (1960) at Animal Nutrition Research Station, Bharari, Jhansi. The study reveals that it contains 42.52, 83.49 and 77.15 per cent of digestible crude protein, T. D. N. and S. E. respectively. Thus it resembles the G. N. cake in the digestible nutrients and is better in all respects when compared to whole guar grain. When ground-nut-cake was replaced by this stuff in the ration of the growing and milk animals of Hariana breed, no difference was noticed in the performances of the animals.

It may be mentioned here that at present this stuff is sold at Rs. 8-50 per maund which is cheaper than any oil cake and grain. On this basis it can very well be said that inclusion of this stuff in the cattle dietary would invariably be economical. This is the reason that this stuff has gained a very important place in the cattle ration of the Aery Milk Colony, Bombay. Not only this, it has also been popular in the farm ration of mechanised state farms in Uttar Pradesh. Similarly this stuff is also gaining popularity among the individual cattle owners.

Lemon grass-Oil-Industry by-products:

Lemon grass grows wildly in the forest area and is also cultivated in the fields in the Kerala State. It is valued due to its essential oil content. It is estimated that about 36 to 40 thousand acres of land are under this grass. The oil from the grass is extracted by steam distillation and exported to foreign countries. As reported, about 80 thousand tons of spent

Lemon grass are left as a by-product of the lemon grass-oil-industry. The chemical composition and nutritive value of the spent lemon grass have been determined by the workers at the Regional Animal Nutrition Research Station, Bangalore.

As reported on dry matter basis this grass contains 6.60, 1.43, 34.33, 51.39, 85.72, 6.25, 0.29, and 0.07 per cent of crude protein, ether extract, crude fibre, nitrogen-free-extract, total carbohydrates, ash, calcium (c-a.) and phosphorus (P) respectively. The nutritive value of the spent grass has been worked out to be 0.64 lb D. C. P. and 49.76 lb. T. D. N. per 100 lb. of dry matter. Thus the nutritive value indicates its superiority over the commonly found straws utilized for cattle feeding in our country.

Sugar Industry by-products :

During the process of manufacturing sugar from sugar cane, molasses and bagasses are obtained as by-products from the sugar mills. In Uttar Pradesh there are many sugar mills and a huge quantity of these by-products are obtained every year. Molasses are utilized in many ways. It is used in the diet of the poor people in our country. To some way it is also used for the preparation of "Hukka" tobacco for which a majority of our country side folk is accustomed. It finds a good place in the alcohol industry as well. For the energy supplement it is a very good source in the cattle dietary. It contains 6.08, 0.92, 93.08 percent of total ash, crude protein, and nitrogen-free-extract respectively. The other by-product bagasses are used for full purposes or wasted. It is quite rich in crude fibre and cattle also do not relish it well. Experiments are in progress at the sugar cane technological Institute, Kanpur and it is envisaged that by turning the bagasses into small pieces and mixing it with molasses in a certain proportion, a product known as bago-molasses can be manufactured and it may be palatable to the cattle. This product may only be called a carbohydrate-rich-substance almost devoid of crude protein which is a limiting factor in the development of our cattle industry in this country. By mixing a protein rich substance along with bago-molasses a substance balance in itself in respect of protein and energy may by prepared.

In the distillary where alcohol is prepared from the molasses by fermentation method, lot of yeasts obtained as by-product is washed away in drains and thus wasted. It has now been thought to collect these yeats, get them dried either in sun or by mechanical drier in the form of cakes. The yeasts are nothing but proteinous matter and contain 50-60% protein on dry matter basis. By mixing the yeasts so obtained with the bago-molasses product in a certain proportion a new by-product from sugar industry viz., bago-mollasses-yeast can be prepared which will be rich in protein and energy both. It can very well replace some of the costly concentrates and lower down the cost of production of milk and the raising livestock. Thus with these by-products which go as waste, a valuable cattle feed for which there is an acute shortage in the country, can be prepared and a good achievement in the national cattle wealth might be assured.

TABLE NO. I.

Chemical composition of Maize by-products
(Percent on dry basis.)

Stuffs	Total Ash	Crude Protein	Ether Extract	Fibre	N.F.E.	T.C.	Ca.	P.
Maize Cake	5.03	30.45	11.24	6.64	46.64	53.28	0.08	0.72
Maize Grit	1.28	17.94	1.30	5.77	73.71	79.48	0.09	0.04
Maize gluten	2.10	49.66	5.11	1.17	41.97	43.14	0.13	0.24
Maize Bran	6.26	7.78	4.34	11.02	70.60	81.62	0.27	0.06
Maize grain	1.94	11.11	4.39	1.90	80.66	82.56	0.09	0.44

N.F.E.—Nitrogen-free-extract ; T.C.—Total carbohydrates.

TABLE NO. II

Digestible nutrients per 100 lb of dry material as compared to other concentrates.

Stuffs	D.C.P. (lb.)	T.D.N. (lb)	S.E. (lb)	Per Lb. of ca. (gm)	dry stuff (p) (gm)
Maize cake	23.14	72.58	70.21	0.36	3.27
Linseed cake	25.86	71.79	69.1	1.68	4.37
Maize grit	12.38	75.62	73.46	0.41	0.18
Cotton seed	12.49	88.77	85.50	1.14	2.50
Maize gluten	44.69	63.15	62.51	0.59	1.09
G.N. Cake	46.39	78.92	75.90	0.91	2.54
Maize bran	3.66	61.58	50.21	1.23	0.27

TABLE NO. III

Control group	Gluten group	Grit group	Cake group	Bran group
Linseed cake 30%	Gluten 30%	L. Cake 30%	M. Cake 30%	L. Cake 40%
Barley 40%	Barley 40%	Grit 40%	Barley 40%	Barley 30%
W. Bran 30%	W. Bran 30%	W. Bran 30%	W. Bran 30%	M. Bran 30%

TABLE NO. IV

Average weekly yield per head in different treatments (lb)

	Control	Gluten group	Grit group	Cake group	Bran group
Basal yield	57.25	53.88	46.40	54.72	51.83
Experimental yield.	47.03	46.40	38.85	52.27	43.37
Per cent fall	17.85	13.89	15.82	4.46	16.32

TABLE NO. V.

Chemical composition of spent grain and Barley
(Per cent on dry basis.)

	Total Ash	Crude protein	Ether extract	Crude Fibre	N.F.E.	T.C.	Ca.	P.
Spent grain	7.17	22.71	3.02	16.71	50.39	67.10	0.25	0.41
Barley	3.21	11.50	1.06	5.39	78.84	84.23	0.13	0.38

Economic Importance Of Age At First Calving

by

M.N. Azmi

VERY little importance is given under village conditions as to when a cow or a buffalo gives its first calf. Mostly the villagers give attention to a cow or a buffalo only when she has calved and has started giving milk. It is very seldom realized that the neglect and the indifference which the animal has suffered before calving must go a long way to affect the milk yield and the cost incurred on raising that animal upto that stage and the total benefits that may be derived from her during its life span. To ensure the first calving at the right age, i. e. in other words to ensure maturity of the animal at the proper time, the breeder has to clearly understand the economics of doing so. Unless this fact is fully recognised, he will be inclined to continue the breeding of animals with the same indifference which exists at present.

To illustrate the economics of early maturity, some of the observations which have been made at the State Livestock Farm, Chakganjaria, are recorded here. The age at first calving in 1955 in case of Sahiwal calves was 43 months and in case of Murrah buffaloes it was 53 months, which in 1960 was brought down to 33 months in case of Sahiwals and 43 months in case of Murrahs. The cost of rearing a Sahiwal calf upto the age of 43 months in 1955 was Rs. 1,048/- and that of a Murrah Rs. 1,352/-. As the calves matured earlier, the cost on their rearing became less. It was Rs. 802/- in case of Sahiwals and Rs. 1,098/- in case of Murrahs; thus resulting in saving of Rs. 246/- and Rs. 253/- in case of Sahiwals and Murrahs, respectively.

The return from these animals in the form of milk also started earlier. On the basis of the average yield of 4529 lbs. for Sahiwals and 4301 lbs. for Murrahs at the farm, there was an income of Rs. 1,242/- and Rs. 1,180/- from sale of milk from Sahiwals and Murrahs, respectively, after incurring an expenditure of Rs. 349/- and Rs. 405/-, respectively, on their maintenance, etc. Thus, an income of Rs. 893/- and Rs. 775/- was realized from sale of milk from Sahiwals and Murrahs, respectively, and a saving of Rs. 246/- and Rs. 253/- in cost of rearing. Roughly one may say that by bringing down the age of calving by 10 months or so, one can save about Rs. 1,000/- per animal in the long run. (Table 1).

The early maturity did not only result in saving of the rearing cost and earlier income from sale of milk, but it also improved the lactation yield both in case of Sahiwals and Murrahs. Good feeding at earlier age is an insurance of good return in long run. The

average lactation yield of Sahiwals in 1955 was 2735 lbs. and in Murrahs 3157 lbs. as compared to 4529 lbs. and 4301 lbs. in 1960. This will also enable us to retain these animals for one lactation extra and thus enable the farm to earn additional income from these animals. Our village animals have the potentiality for an early maturity. This fact has been amply proved at many of our district and village shows, where the owners were explained the significance and the economics of the age at first calving and prizes were given to the heifers brought to the show which were found mature as judged from their permanent teeth or were found pregnant at the right age. The realization of this fact and the adoption of practices leading to early maturity could bring about a major change in our cattle breeding economy. It was only for this reason that more prizes were reserved for the heifers' class, which was further divided into 3 or sometimes 4 classes with the result, heifers with temporary teeth, 2 teeth and 4 teeth were judged separately. As far as is known, this classification has not been followed even at All-India Shows.

The early maturity can only be ensured by giving due care right from the stage the calf is in its dam's womb upto the time of its calving. The expectant mother should be cared well all along, but more so during the last 2 months of its pregnancy, when a well balanced ration rich in proteins should be fed to ensure the birth of a healthy calf. It will not be out of place to mention here the significance of the birth weight in determining the future life history of the animal. A good birth weight invariably predetermines good growth of the animal and also a good yield. The observation made at Chakganjaria Farm show that the Sahiwal calves weighing above 45 lbs. at the time of birth calved at the age of 2 years and 9 months, while calves weighing below 45 lbs. calved much later. It may not be possible to have a weigh-bridge under village conditions, where a visual examination may give sufficient indication whether the calf has normal birth weight or less, but at the State Farms the weigh-bridge should form an essential part of the equipment if animal management has to be carried out on scientific lines.

Young calves are extremely susceptible to parasitic infection and, therefore, drenching of calves by a simple mixture (*) of Copper Sulph., Mustard, at fortnightly intervals can ensure freedom from parasites to a large extent. At the State Livestock Farm, Chakganjaria, monthly drenching of calves started and adult

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(*) (a) Copper Sulph. ... 1% solution.
(b) Dried leaves of tobacoo... 1 oz. in one lb. of water soaked overnight.
(c) Mustard ... 1 gram.

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animals were also drenched once or twice a year to check possibility of pre-natal as well as post-natal parasitic infection. This went a long way to reduce the mortality, especially in buffalo calves, who previously used to die in large numbers. The availability of various minerals such as Calcium and Phosphorus should be ensured. This was being done at the Farm by feeding of mineral (*) mixture prepared at the Farm consisting of bone-meal, chalk, salt, zinc sulph,. Manganese chloride, Copper sulph., Ferri sulph., Sodium iodide, Mag. sulph. and Cobalt chloride. This was mixed at the rate of 3% of the total concentrates fed to these animals. Last but not the least, proper shelter and feeding of these calves was assured, and those calves, which for some reason or other, did not pick up their weight were given extra attention.

The care of our young calves has given dividends more than what was anticipated and it will be worthwhile for a cattle breeder to adopt these simple measures for obtaining better production at economical rates.

TABLE 1.

Year	No. of heifers calved.	Age at first calving.	Cost of rearing to the date of calving	Average lactation yield.	Receipts from sale of milk realized upto the age of 43 months for Sahiwal & 53 months for Murrah.	Net Expenditure.	Remarks.
		Months	Rs. As. Ps.	Lbs.	Rs. As. Ps.	Rs. As. Ps.	
SAHIWAL							
1955	28	43	1,048- 6-6	2,735	—	1,048- 6-6	The cost includes the direct and indirect expenditure, i. e.
1956	44	39	950- 8-2	3,069	338- 8-0	868-12-3	(a) Feeding.
1957	43	38½	938- 5-3	3,670	450- 0-0	782- 3-6	(b) Labour.
1958	21	38	926- 2-3	4,044	551- 4-0	715- 6-0	(c) Supervision.
1959	24	36	877- 6-4	4,317	830- 4-0	532-11-4	(d) Depreciations.
1960	33	33	802- 6-6	4,529	1,242- 9-0	155- 0-6	(e) Interest on investments. (f) Misc. expenditure.
MURRAH							
1955	17	53	1,351-12-0	3,157	—	1,351-12-0	
1956	22	48	1,223- 5-9	3,504	478- 5-0	1,140- 1-3	
1957	18	46½	1,185- 1-6	3,612	641- 4-0	1,053-15-7	
1958	20	45	1,146-13-3	3,809	832- 8-0	970- 3-6	As above.
1959	44	44½	1,134- 1-3	4,259	993- 6-0	858- 7-9	
1960	19	43	1,098- 0-0	4,301	1,180-12-0	576-12-0	

(*) Bone-meal	... 7 mds. & 33 srs.	Chalk	7 mds. & 33 srs.
Salt	...15 ,, 25 ,,	Zinc Sulph.	1 lb. & 2 ozs.
Manganese chloride	... 1 lb. & 2 ozs.	Copper Sulph.	1 lb. & 2 ozs.
Ferri Sulph.	... 2 ,, ,, 2 ,,	Sodium iodide	7 ozs.
Mag. Sulph.	...10 ,,	Cobalt chloride.	7 ozs.

PROSPECTS OF GOSAMVARDHANA IN ADIVASI AREAS

By Shakti Trivedi

THE various tribes inhabiting Assam, Bengal, Rajasthan, Madhya Pradesh and remind us of our ancient civilization. All over the hilly and dense forestry areas, the lives of *Adivasis* are full of activity and truely speaking, these *adivasis* both male and female are the real watchmen of mineral and forestry wealth of the country.

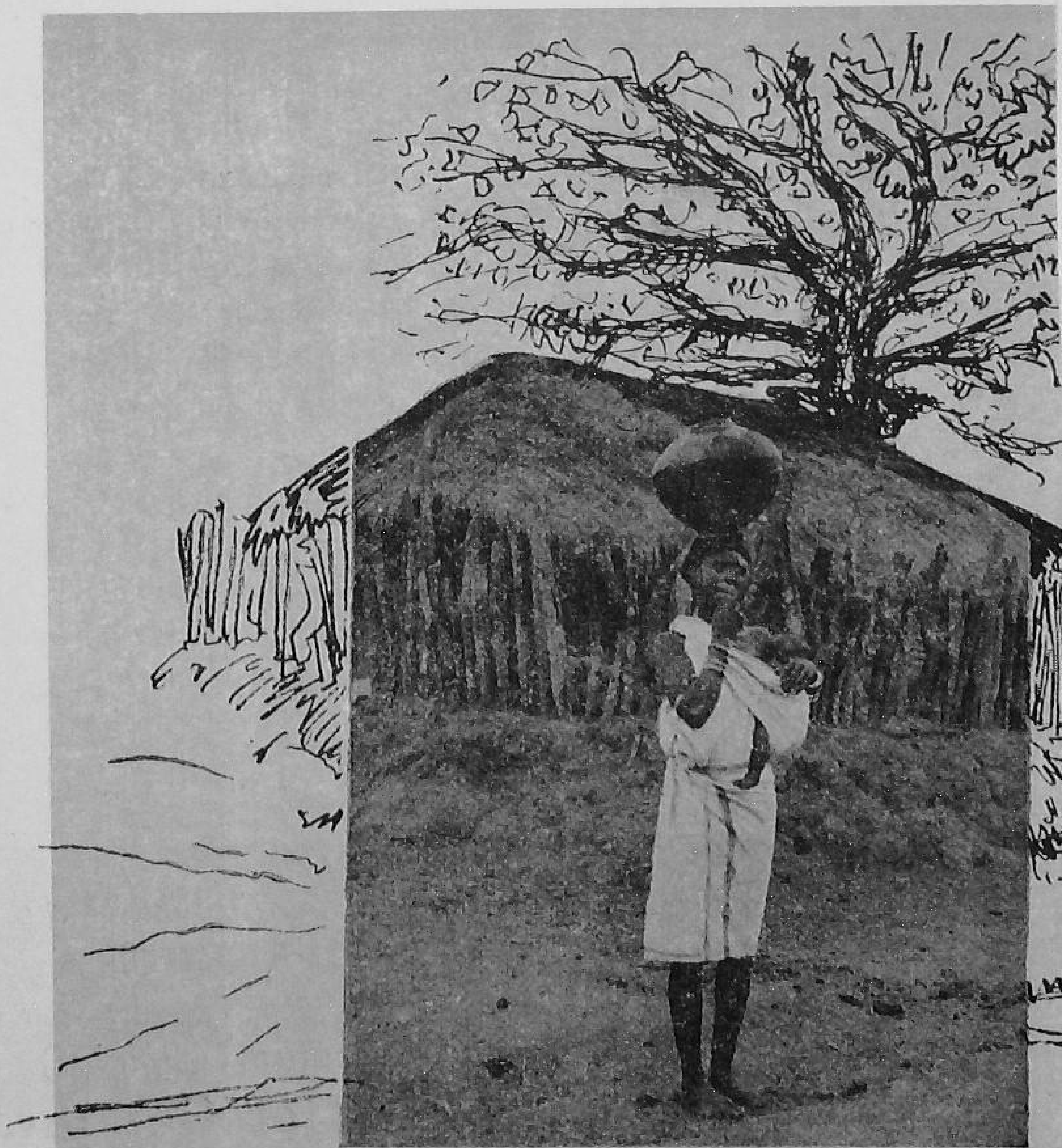
In Rajasthan and Madhya Pradesh tribalmen are thickly populated, they earn their livelihood by means of cultivation, cow-rearing and by selling medicines, fruits and honey etc. In hilly areas where the land is useful for cultivation, they live on cattle-rearing.

Most of the *adivasis* have milch animals. Cow is the main wealth of these poor *adivasis*.

Between the Parwati and Chambal Rivers, the border areas of Rajasthan and Madhya Pradesh is hilly, fertile and full of dense forests. Cultivable land is hardly available. The tribal race of *Sahariyas* is striving hard for its livelihood in this area. The land where they are living is almost fertile and of high yields. Sugarcane can be produced here in large quantity, because the problem of irrigation has itself been solved. All over the land many streams and small hilly rivers flow and the land is itself irrigated.

In summer, these natural streams multiply and land worthwhile for cultivation is able to get water for irrigation. Where no agricultural production is made, all areas of these hills are covered with grass.

I felt, the *adivasis* of this areas are a miserable lot, struck down by poverty and living a



life of exploited-beings. But it is notable that even in such a poor condition of life they have tamed cows. And they believe cow as a mother of prosperity. Here people say that a man with cow, is a man of wealth.

Due to monarchial and *Samanti* exploitation, they have been more driven to poverty. They are extremely burdened with heavy ancestral loans that they even in two or three generation, perhaps can not pay back the loan. The main cause is that the means of livelihood of these poor people are being exploited by monopoly system in Rajasthan. Though they do hard labour still they do not get rid of this loan. The grass and fodder springs up here in such a huge quantity that every year for agricultural purposes they have to cut off the surplus grass and other non-useable vegetables. For two or three purposes the bulk of waste grass and fodder is used as fuel. If the work of cow-rearing on a systematic basis is started here, all this waste grass and fodder can be utilized usefully.

Big dairies can be started near this area and the cow rearing, milk production and allied production can be started effectively. Even the hard labour done by them does not provide them with stomatch-full food. Cow, which is the only boon to their lives can raise the living standard of these tribals. Firstly, the area, where these people inhabit is full of grassy and forestry areas. Thus the fodder is all the time available for the cattle, tamed by these people.

For uplifting the life of these *adivasis*, it is necessary that Government should take interest in establishment of big Co-operative dairies, Goshalas and breed improvement centres in which the management may be looked after by the State Government, but basically this trade must be of the people.

With regard to the question of Veterinary assistance in these areas it has been observed that although in simple cases the *adivasis* know the method of curing the animals by natural medicines as *Jadi Bootis* are found in plenty which are mixed with other grasses and vegetables. Even the human beings, are cured of many diseases by means of these indigenous type of medicines. Specially *Sahariya adivasis* are more acquainted with the healing measures with regard to animals. If able doctors and Ayurvedic healers could be available to them in making medicines for these animals, they can be greatly benefitted.

Besides this, through the agency of Khadi and Gramodyog Board, the financial and such other problems of these *adivasis* can be solved by providing them with some other small-scale industries and loans etc. Government's Forest, Co-operative and Social Welfare departments can also be instrumental in assisting these poor *adivasis* by encouraging cow-rearing business. They can also be rehabilitated at one place. In a nutshell, it must be emphasised that the process of raising their living standard must be started with the profession of cattle-rearing.

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(*Contd. from page* 21)

A Day A Month which may involve less cost but provide sufficient data for the individual owners about the performance of their own herds. The data collected by these programmes, are, however, not utilised for purposes of proving bulls. They are also seldom acceptable for use in the sale of stock. The owner sampler testing is similar to the dairy herd improvement association except that the owners themselves record the yields of their cows every month and collect samples of milk. The supervisor collects the samples and runs fat test on them and the records for the cows and herds are computed from the figures supplied by the farmers. These records are treated only as private records as mentioned earlier. The Weigh A Day A Month Plan helps the dairy farmers to obtain private, simple but adequate information to judge the performance of their cows. Under this system no butter fat samples are taken and only the milk yield of each cow in the herd (usually on the 15th of each month) are taken by the owners in simple forms recommended by the State Dairy Extension dairymen. From this data up-to-date production for individual cows and for the herds are computed and mailed back to the owners. Because of the simplicity and lesser cost these programmes are also becoming popular and by the end of January, 1960 about 3.2% and 0.4% of dairy cows have been included under the Owner Sampler and Weigh A Day A Month Plan. The Extension Departments have taken steps to popularise these methods with a view to make all dairy farmers record-conscious so that ultimately they may like to shift on to the standard DHIA and thereby receive the full benefit of the testing system.

Herd Improvement Registry and Advanced Registry :

The recording programme detailed in the preceding paragraphs are plans sponsored for all round improvement in the genetic efficiency and productive capacity of all cows and herds irrespective whether they are pure-bred, cross-bred or grades. But for definite and progressive improvement among the cows registered by the Pure-bred Breed Associations special testing programmes have been introduced by these associations for the benefit of the pure-bred breeders.

When the breed associations were started the fact that a pure-bred animal was registered and was considered as sufficient evidence of superiority. But in course of time it was found that many inferior animals also got registered and only private records of production on them were reported on which there was no check for accuracy. The breed association thought it fit therefore, to evolve certain production testing programmes for assessing the individual merits of high yielding registered cows. These are variously called, for example, the Register of Merit by the American Jersy Cattle Club, Advanced Registry by Holstein Freisien Association and American Guernsey Cattle Club, Register of Production by Brown Swiss Breeders Association, a Record of Merit by Milking Shorthorn Association, etc. This type of testing has become almost a necessity for the pure-bred breeders because it will be difficult for them to sell pure-bred cattle for higher prices unless they or their ancestors or relatives have been recorded in the advanced registry or herd improvement test or by the DHIA. Under these programmes the tests are supervised and checked by the State Agricultural Colleges and also directly by the associations. Advanced Registry testing has, however, certain disadvantages such as the tendency on the part of the breeders to put only the best cows on test, possible encouragement to use selected records, late breeding of cows on test, high expense etc. In order to overcome some of the above disadvantages, a herd test now popularly known as the Herd Improvement Register was started. Under this programme records of the entire herd are obtained for making definite herd improvement. In practice it was found that as the supervisors of the dairy herd improvement association are also permitted to do the testing and the work is supervised by the State agricultural colleges, it will be a duplication to have separate computation for the DHIA and the HIR. Therefore, the breed associations now recognise the computation of the State data processing laboratories of the dairy herd improvement associations from pure-bred herds for HIR in such States where the Agricultural colleges have introduced mechanical compilation and computation of records and this new system is now known as the DHIR. This type of testing has become increasingly popular among pure-bred breeders and it has given the impetus to the proving of sires and increased production of herds.

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